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ABSTRACT

One concern frequently cited regarding early childhood programs is that methods for assessing some of their more important objectives are inadequate or nonexistent. This paper addresses this concern in the areas of health, safety, nutrition, dental health, and physical development during the preschool years. An organizing framework for classifying the outcomes of early childhood programs in these areas was developed during the first phase of the Head Start Measures Project. In order to determine which characteristics of children's development are important to measure, two surveys were conducted: (1) a survey of 22 child development scholars; and (2) a survey of 375 primary school teachers, and Head Start teachers, parents and staff. The organizing framework resulting from analysis of survey data includes four content dimensions (health and safety, dental health, nutrition, and motor development). Each content dimension contains from 3 to 10 clusters of variables, or constructs. These constructs are discussed in terms of recent literature, especially research on the pilot testing of assessment techniques. It is suggested that these techniques can be used by early childhood programs to conduct their own evaluations to provide comprehensive, in-depth assessments of the effectiveness of health-related program components. (CB)

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HEALTH AND PHYSICAL DEVELOPMENT IN EARLY CHILDHOOD PROGRAMS: RECOMMENDATIONS FOR PROGRAMS AND THEIR EVALUATION

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HEALTH AND PHYSICAL DEVELOPMENT IN EARLY CHILDHOOD PROGRAMS: RECOMMENDATIONS FOR PROGRAMS AND THEIR EVALUATION[1]

One concern frequently cited regarding early childhood programs is that there are inadequate or nonexistent methods for assessing some of their more important objectives. Based on a careful examination of the literature, input from experts in various health-related fields, and pilot-testing of a wide range of assessment techniques, this paper addresses this concern in the areas of health, safety, nutrition, dental health and physical development during the preschool years. The purpose of this review is to emphasize the importance of fostering health and physical development in early childhood programs and to recommend components that programs should emphasize. In addition, techniques are discussed whereby programs can conduct their own evaluations to provide comprehensive and in-depth assessments of the effectiveness of such program components.

The Importance of Health-Related Program Components

Many child development scholars and practitioners recognize that health and physical development of young children is fundamental to their effective functioning in all other domains of behavior. Its importance for Head Start, for example, is shown by the extensive program guidelines for implementing health and nutrition components in the Head Start Program Performance Standards (OCD, 1975, pp. 16-54). The report of the Fifteenth Anniversary Head Start Committee (1980), appointed by the President of the United States, referred to

the Head Start Program as the primary provider of health care to children from families of low socio-economic status. Daycare programs similarly value children's health and physical growth, and to varying degrees provide health services such as physical exams and hearing, speech and vision screenings (Coelen, Glantz & Calore, 1978). In the national accreditation system for early childhood programs being developed by the National Association for the Education of Young Children, health, safety, nutrition and food service are considered critical components (NAEYC, 1983). Further evidence of the importance of health and physical development is found in the statements of Head Start parents and teachers obtained through the Input Workshops held during the Head Start Measures Development Project (described below). Of the 50 most highly valued child outcomes rated by these participants, more than half (28) referred to health and physical outcomes; and seven of the ten most highly valued outcomes referred to characteristics of health and physical development (Mediax Associates, 1980).

Some developmental psychologists have even considered the physical domain to be more basic than all others: "All the skills, aptitudes and emotions of the growing child are rooted in or conditioned by his bodily structure" (Tanner, 1970, p. 77). In discussing elements to be included in an index of "social competence", Zigler and Trickett (1977) listed physical health measures first, pointing out that this should counterbalance the reluctance of some scholars to associate physical health with children's "social" competence. When the Administration for Children, Youth and Families (ACYF) launched its effort to develop measures for assessing "social competence" in Head Start children, it began with a conception of social competence as broadly conceived as the Head Start program itself. Therefore, the plan for measures development, as articulated

and developed by ACYF's contractor, called for measures that would encompass not only the cognitive child outcomes that are so often exclusively assessed, but outcomes in other critical domains as well, including health and physical development (Mediax Associates, 1980).

An Organizing Framework

To ensure a comprehensive treatment of a domain as complex as health and physical development, it is useful to begin with an organizing framework. Such a framework was developed during the first phase of the Head Start Measures Project (Mediax Associates, 1980). It is a useful system for classifying program outcomes because it has its basis both in program concerns and in scholarly research. Before describing how the program outcomes in health and physical development are organized, the evolution of the classification system is briefly reviewed (a more detailed discussion can be found in Mediax Associates, 1980).

The Head Start Measures Project conducted two surveys in order to determine the characteristics of childrens' development that would be important to measure. First, 22 child development scholars representing diverse viewpoints were surveyed for their views on the domains of behavior they believed to be most significant for evaluating the quality of young children's development (ages 3 to 7 years). They were also asked to specify the behavioral characteristics which operationalize those qualities, therefore providing a useful guide for assessment.

The second survey was conducted by means of two-day workshops in which Head Start parents, teachers and staff and public school teachers of Head Start "graduates" were asked to describe the things they would want a child to be able to do to prove that he or she had certain qualities (e.g., has school readiness

skills, has good physical development, has good dental habits). Participants were then asked to rate the importance of the characteristics that were listed. Responses were elicited from 375 participants in workshops held in six locations around the country in the spring of 1978.

Mediax Associates then developed a detailed classification system to organize the hundreds of characteristics identified by the scholars and program participants. The details of this system are not critical here (see Mediax Associates, 1980, Chapter III), but it is important to the review of health issues to note an important feature of the classification system: In adition to grouping the child characteristics by developmental domain (cognitive, health, etc.), four different types of processes were identified. The types of characteristics included (a) knowledge and skills, (b) attributes and habits, (c) physiological statuses, and (d) executive skills. Consideration of all the child characteristics obtained from the two surveys in light of these types revealed that program outcomes in the area of health and physical development encompass much more than the physical variables that are typically considered. Thus, an important concern in the present review is an examination of the knowledge and skills, the attitudes and habits, and the physiological statuses that are all embodied in the health and physical outcome variables to be presented.

The other major organizing factor is content. The Mediax classification system organized the health-related child development outcomes into four content dimensions:

1. health and safety;
2. dental health;
3. nutrition; and
4. motor development.

The classification of developmental outcomes into these dimensions is based primarily on custom and convenience for practitioners, curriculum developers and program managers, and there is considerable overlap between dimensions.

Throughout this paper the major clusters of variables within a dimension will be referred to as constructs. Table 1 summarizes the constructs and characteristics that were selected for measurement in this system. What follows is a detailed description of these constructs and characteristics, the rationale for their selection, and suggestions for including them in program evaluations.

-- Insert Table 1 about here --

Rationale for Constructs, Characteristics and Measurement Techniques

The constructs of health and physical development encompass diverse types of characteristics. They include physiological conditions and the knowledge, attitudes and habits that contribute to long-term health. In addition, program services, such as innoculations and provision of eyeglasses when needed, support improved health conditions and should be included among the constructs to be measured. In every case we emphasize characteristics on which it is reasonable to expect programs to have an impact.

In this discussion particular importance is placed on the development and measurement of knowledge, attitudes and habits because these types of characteristics reflect changes in children that can endure and show lasting effects beyond the preschool years. As will be seen, there are aspects of children's attitudes and habits that relate to health, safety, dental health and nutrition.

Two other general concepts are important to this domain. The first is the notion that children's resistence to disease and other disorders is increased by programs that provide "protection" from vulnerabilities, as in the protection from disease provided by innoculations or the protection from poor physical development that is provided by good diet and exercise. A number of the constructs throughout this domain reflect a concern with assessing the extent to which this protection is provided by a program. The second important general concept is that of "resilience" since one's resilience or ability to recover from physical illness or rebound from emotional upset is one sign of wellness in healthy individuals. Two aspects of resilience are included--physical resilience (or physical fitness) and emotional resilience (or resilience to stress).

The following sections of this paper present a discussion of the rationale for the selection of each construct, the reasons for focusing on particular characteristics to be measured within each construct, and a brief description of one or more evaluation instruments or techniques for measuring each characteristic or construct.

Health and Safety Dimension

The Health and Safety Dimension consists of ten constructs that include physiological conditions, knowledge, and attitudes and habits related to children's health and safety. The constructs are anthropometric status, immunization status, vision, hearing, speech, physical fitness, functional stress range, health attitudes, health knowledge, and safety knowledge.

Anthropometric Status

Anthropometric status is a standard index of children's physical growth and overall physical health. Medically accepted standards exist for determining whether a child (or group of children) is developing adequately or not, and extensive normative data are available for comparison purposes (National Center for Health Statistics, 1973). Anthropometry is the most frequently performed child health screening procedure (Frankle & Owen, 1978; Stebbins, et al., 1978) and is a component of the standard health screening provided by all Head Start programs (OCD, 1975).

Anthropometric status is not something we expect early childhood programs to show a major impact on, except in special cases where children may be at risk because of unusually poor health when they enter the program. In such cases (which can be identified by the administration of these measures upon

entry into the program) e.g., children who are below the tenth percentile of height-for-age, programs can expect to demonstrate measureable gains on the anthropometric status indices. For children with more normal health histories, programs can expect these anthropometric characteristics to demonstrate stable growth and not to show dramatic program effects.

Height and weight are the traditional basic anthropometric measurements (Frankle & Owen, 1978; Tanner, 1970). Change in height over time provides an overall index of healthy growth since most measurements of the body (including the great majority of skeletal and muscular dimensions) follow approximately the same growth curve as that of height (the major exceptions are the brain, skull and subcutaneous fat--Tanner, 1970). The following summarizes the value of including height assessment:

> "Stature has probably been used as a parameter of human growth as frequently as all other parameters combined because of its many conceptual and technical advantages: it lends itself to easily obtainable yet relatively accurate measurement; it is readily understood by almost all people; it is useful; and it is highly correlated both with the chronological age of the growing child and most of his other physical, physiologic and behavioral parameters" (Hamill, Palmer & Drizd, 1978, p. 9).

Height and weight measures can be obtained using balance beam scales available in many schools, clinics, Head Start programs and daycare centers. From the height and weight measurements, various indices can be derived. Three easily calculated indices--height for age, weight for age, and weight for height--provide growth indices that can be referred to standard reference norms (Roche, Siervogel, Chumlea & Webb, 1981).

Immunization Status

Many of the diseases that once plagued childhood in America, such as diphtheria and polio, have been all but eliminated with the widespread practice of providing immunizations and requiring them for school entrance. In spite of this practice, however, a surprisingly large proportion of young children have not been immunized. Among children aged 1 to 4 in 1978, about 38 percent had not been immunized against rubella, 37 percent had received no measles vaccination, 49 percent had not received mumps vaccination, about 39 percent had not received the recommended dose schedule of polio vaccine, and 32 percent had not received the appropriate series of DPT vaccinations (DHHS, 1980, p. 63). Zigler and Lang (1983) recently reported that the percentage of Head Start children receiving a complete immunization series ranges from 59 to 83 percent in different programs. It is therefore still important for programs to provide these immunizations, or to help arrange for them. Then, the measurement of children's immunization status can demonstrate the impact that the program is having.

One guideline for immunizations is the Head Start Performance Standards (OCD, 1975, p. 29):

1. DPT--at least three doses of diphtheria-pertussis-tetanus vaccine.
2. Polio--at least two doses of trivalent oral vaccine or three doses of monovalent oral vaccine plus one of trivalent.
3. Rubeola (Measles)--one dose of live measles vaccine (or history of naturally occurring measles).
4. Rubella (German Measles)--one dose of live Rubella vaccine or serologically documented immunity.
5. Mumps--to be included if part of a combined vaccine used in the immunization program or history of naturally occurring mumps.

Programs should also make provision for the possiblity that in a particular community the public schools may require additional innoculations.

Vision, Hearing and Speech

These three are discussed together because of their similarity in terms of the rationale for their inclusion and the methods of measurement. Each represents a characteristic of development for which Head Start and many other early childhood programs provide screening in order to ensure that any problems in these areas will be detected and so that corrective action can be taken. Each also represents a characteristic of development that is an important aspect of physical development that has ramifications beyond physical health. Good vision and hearing are both critical to learning and to participation in many academic and social activities. The early detection and correction of vision and hearing problems can protect children from early difficulties in learning to read and other academic activities. The amelioration of speech difficulties can lead to improved classroom academic performance, better communication skills, and improved social relationships with both peers and adults.

The incidence of vision deficiencies in children under six years of age is not well documented on a national basis, and the figures that are available do not provide separate statistics for low-income children. According to one report from the Center for Health Statistics (DHEW, 1977), the percentage of four-, five- and six-year-old children with visual acuity poorer than 20/50 was 2.1, 1.8 and 2.5, respectively, in 1971-72. In another report from the same agency, it was reported that 7.4 percent of six-year-olds had defective visual acuity when defined as acuity of 20/40 or less (National Center for Health Statistics, 1978). Aronson (1981) reported that between 5 and 6 percent of preschool children have one or more vision defects and that this increases to between 20 and 25 percent

during school age. Pretest data from the Head Start Health Evaluation in 1980 (Fosburg, et al., 1984) provide more recent evidence on the extent of visual problems among Head Start eligible children in selected sites. The following ranges were found in the percentage of children with various types of vision deficiencies across the four sites included in that study:

Ocular-motility (coordination of eye movement and focus on moving target):	30.5 to 59.6 percent
Strabismus (both eyes cannot be directed at same object):	2.1 to 13.0 percent
Convergence (ability to focus on target at less than 5 inches):	4.3 to 12.9 percent
Hyperopia (farsightedness):	3.4 to 15.7 percent
Myopia (nearsightedness):	0.0 to 3.7 percent
Astigmatism:	1.1 to 12.9 percent
Stereopsis (ability to perceive three dimensionality):	12.2 to 24.7 percent
Binocular integration	1.2 to 37.9 percent
Visual acuity less than or equal to 20/40:	2.9 to 4.7 percent

Overall, the percentage of children with at least one of these deficiencies ranged from 41.1 to 73.5 across the four sites.

Estimates of the prevalence of hearing problems also vary widely. It has been estimated that approximately one child in every 1,000 has a severe hearing loss; eight per 1,000 have persistent bilateral impairment of more than 30 decibels; and 15-30 children per 1,000 have some degree of hearing impairment (Gordon, 1980).

Large scale surveys of school children have reported estimates of the incidence of "defective hearing" that range from 2 to 21 percent, undoubtedly

due to different definitions, measurement techniques, and populations surveyed (Silverman, 1971). Silverman's "best estimate" is that 5 percent of school-age children have hearing levels outside the normal range and that 12-20 percent of those require special education. Statistics for preschool children should be about the same (Silverman, 1971, p. 403). The National Center for Health Statistics (1978) has reported that the incidence of defective hearing in six-year-olds (i.e., hearing levels in the better ear of 16 dB above audiometric zero at 500, 1000 and 2000 Hz--the frequencies in the speech range) was only 0.1 percent; this figure increases to 0.5 percent at age seven, but this is based on more lenient criteria than most studies use. Aronson (1981) concludes that the reported prevelence of hearing impairment varies from 3 to 20 percent, but that "impairment is sufficiently common to warrant screening of infants and children" (p. 262).

Reliable data concerning hearing levels for children less than six years of age are not available on a national basis, but the Head Start Health Evaluation (Fosburg et al., 1984) found that the percentage of children with a deficiency in hearing threshold within the speech range (25dB at 500 Hz; and 20dB at 1000 or 2000 Hz) in either ear ranged from 14.4 to 47.2 percent among the Head Start eligible populations in their four sites. Hearing loss at 4,000 Hz (25 dB threshold) ranged from 7.2 to 32.4 percent of the children in different sites.

Data on speech impairments are even less accessible than for vision and hearing problems. The National Center for Health Statistics (1978) has reported that 12.8 percent of six-year-old children have some "speech defect", but that statistic was derived from parent reports. Based on an in-depth testing procedure using the Denver Articulation Screening Exam and other measures, the Head Start Health Evaluation found that the percentage of children "at risk" ranged from 42 to 65 percent across the four sites. Other sources yield lower

rates. Hull and Hull (1973) report only 6.6 percent of children in the total population have delayed speech, articulation, voice and stuttering problems. Milisen (1971) cited six surveys that yielded a wide range of estimates of the incidence of speech disorders among elementary school children. The estimates from these studies, which typically surveyed individual cities or states, ranged from 1.0 percent in one community in a 1931 survey to 33.4 percent in a 1942 study. The surveys based on the largest samples reported incidence of speech defects in the 7 to 10 percent range. Bennell et al. (1978) cited Head Start speech and language screening conducted in four southeastern states in 1975-76 in which more than 10 percent of the children failed the screening; professional follow-up found that 84 percent of those who failed required professional services. Fosburg et al. (1984) found that from 14.1 to 25.9 percent of Head Start children (depending on the site) had articulation problems as measured by The Denver Articulation Screening Examination.

Because of the range of available and acceptable procedures (International Training Consultants, 1978) it is not necessary to prescribe particular instruments for assessing vision, hearing and speech. The important element for local assessment is a plan for administering these measures on a schedule that conforms to the requirements of valid program evaluation (i.e., fall and spring) and procedures for recording the measurement results for integration into an overall health profile.

Physical Fitness

Children's physical fitness is of increasing concern to parents, educators and medical personnel. It specifically relates to a number of the desired characteristics mentioned by the Head Start parents and teachers in the Input Workshops conducted by Mediax (e.g., "develop physical strength up to poten

tial", "be well developed physically", "seek challenge to physical ability", "regular exercise", "be able to engage in vigorous activity without tiring"). Fitness was specifically recommended by the project's health and physical subpanels because it may serve as an outcome indicator for good nutrition and general health status as well as being a direct result of the physical activity and exercise provided by the program.

Improved fitness is also a key factor in decreasing children's vulnerability to a number of physical, social and psychological problems. For example, it has been estimated that "one of every six children in the United States is so weak, uncoordinated, or generally inept that he or she is physically underdeveloped by the standards of the President's Council on Physical Fitness and Sports" (PCPFS, 1977, p. 1). The consequences of underdevelopment in fitness can frequently be reflected in lowered self-esteem and negative attitudes toward physical activity. In turn, children's social relationships can also be adversely affected.

Unlike the characteristics discussed above, a concern for physical fitness raises both conceptual and measurement problems. Conceptually, "fitness" is difficult to define since the immediate question is "fitness for what purpose?" In athletics, different sports require different types of fitness, for example. There is some precedence, however, for identifying the elements that these activities have in common. According to Baumgartner and Jackson (1975), many medical authorities consider "aerobic working capacity", or the individual's ability to perform work, to be the best index of physical fitness. This is one of the three components of physical fitness as it is defined by the President's Council on Physical Fitness and Sports: muscular strength, muscular endurance and circulatory-respiratory endurance (Clarke, 1971). Muscular endurance is not recommended for assessment because of the extended time that is required to

obtain a valid measure of true endurance. A number of different measures of strength and circulatory-respiratory endurance (aerobic working capacity or cardiovascular efficiency) do exist but vary greatly in their suitability for use in this project, as discussed below.

The definition of fitness given by the President's Council emphasizes performance. As Malina (1981) points out, however, anthropologists and developmental psychologists also consider an "organic" component to physical fitness. Consideration of the organic component emphasizes the relationship between physical performance indicators and the physical growth and maturation of the child, since the capacity to perform and the energy required for endurance and strength are both a function of the child's physical growth and well-being. Therefore, for completeness in measuring physical fitness, it is important to include a third characteristic, lean body mass, because it is a standard indicator of physiological growth (Himes, 1980; Roche, Siervogel, Chumlea & Webb, 1981). Measurement procedures for the three characteristics of physical fitness--muscle strength, cardiovascular endurance (efficiency) and lean body mass--are discussed in the following paragraphs.

Muscular strength can be easily measured by assessing children's hand-grip strength using a standard hand dynamometer calibrated for the range appropriate for children's strength. The selection of this particular measure is based on a combination of research evidence and administrative convenience. Hand-grip strength, as measured by a standard dynamometer, is a rapid and reliable procedure (Methany, 1940; Parizkova, Cermak & Horna, 1977) that can be easily administered by paraprofessionals; and children can be easily motivated to perform with this instrument. The main issue in selecting this measure, then, is to confirm that hand-grip strength is a valid indicator of "muscular strength".

Unfortunately there is a tendency for strength measures to be somewhat specific to the muscle group being measured so that no single measure is a perfect indicator of overall strength and fitness. Some studies have used multiple measures (e.g., right and left hand-grip, back and leg lifts, pullups and bar pushups) but this approach is impractical. In the Medford, Oregon growth study, hand-grip strength was found to correlate as highly as any other single strength measure with the other measures of strength (Clarke, 1971), confirming hand-grip strength as a valid indicator of the muscle strength component of fitness.

Muscle strength is obviously influenced by body size (weight and stature) as well as physical fitness. Strength is not simply a function of the quantity of muscle tissue, however, as studies have found only moderate correlations between muscularity, or amount of muscle tissue, and strength (e.g., Dempsey, 1955; Malina, 1975; Rarick & Thompson, 1956). It is clear, then, that strength measures reflect aspects of physical functioning as well as size and quantity of the musculature. Because of the moderate correlations between strength and body size, however, the child's weight should be controlled for in calculating the strength index.

Another indication of the value of grip strength as a measure of physical fitness comes from the Framingham Heart Study in which a low-to-moderate correlation between grip strength and forced vital capacity (FVC) was found (it ranged from .21 to .39 in various age groups in adulthood--Kannel, Lew, Hubert & Castelli, 1980). Since forced vital capacity is one of the best indicators of a person's general state of health or "capacity for living", the correlation with grip strength further supports the assertion that "grip strength may be an index of physical fitness" (Johnson, 1981, p. 1994).

The second component of physical fitness is circulatory-respiratory endurance or cardiovascular efficiency. An adaptation of the standard step test can be used for assessment. The determination of heart rate before, during and after exercise is one of the simplest and most widely used means of testing the functional capacity of the cardiovascular system. It is based upon the linear relationship between workload and heart rate (Astrand & Rodahl, 1977). The step test has been a standard measure of cardiovascular efficiency in adults, and recent research has modified this procedure for use with children. Parizkova and her colleagues (Parizkova, Cermak & Horna, 1977; Parizkova & Adamec, 1980) have successfully used a 9-inch high step (about the height of steps on most stairways) with 3 to 5 year olds. It is similar to step-test procedures that are recommended for use in the public schools (Baumgartner & Jackson, 1975). The procedure was pilot tested with small samples of Head Start and first-grade children during the development phase of the measures program, with results paralleling those of Pariskova et al. (1977).

The third component of physical fitness is based on an index of the overall healthy physical growth of the child, lean body mass, or, conversely, percent body fat (%BF). The best correlate of %BF is triceps skinfold thickness (Rocho, et al., 1981), which can be obtained by a rapid and reliable procedure. Studies have demonstrated increased lean body mass and decreased body fat during physical exercise programs in older children (Malina, 1979). The two most common skinfold measures are subscapular (back of the chest) and triceps (mid-upper arm). Because of its convenience (not requiring undressing) triceps skinfold thickness is the most straightforward procedure. It is widely used as a standard component of nutritional assessment (Frankle & Owen, 1978)--see discussion of the Nutrition Dimension below--and could be readily adopted for use in program evaluations.

Stress

Stress was identified as a critical factor in overall health at one of the early meetings of medical consultants in Phase I of the measures project (Randolph, et al., 1978). Stress can affect a child's stamina, resistance and resilience (Gordon, 1980). Selye (1975) notes that, although human beings thrive on certain degrees of stimulation, excessive demands can have harmful consequences, causing fatigue, exhaustion and physical and mental breakdowns. Stress reactivity of children has also been related to overall developmental processes in the sense that stimulation is required for children to progress developmentally, with too little stimulation being perhaps as detrimental as too much. "Incompetent" behavior in school and later life may, in fact, be motivated by stress avoidance. As Taub pointed out in a paper prepared for the Head Start Measures Project, our concern is with identifying the correlates of dysfunctional behavior resulting from tension beyond the limits of particular children's "functional stress range" (Taub, 1980, p.41).

Although there is no research we are aware of that directly addresses the question of whether a program such as Head Start can have effects similar to more systematic stress-management training, discussions with experts and Head Start personnel have led us to conclude that there are five reasons to expect that reduction of stress reactivity or increased functional stress range in children may be an outcome of program participation:

1. Head Start provides familiarity with school-like situations, especially those situations which place demands upon the cognitive abilities of the child, i.e., settings which are like the tests administered in schools. Since familiarity with settings reduces the level of stress reaction to those settings, Head Start is expected to reduce children's stress response and may widen the functional stress range.

2. Head Start enhances children's locus of control. An increased sense of control over one's own activities and environment reduces stress reactivity.

3. Through its impact on parents and the family, enhancing the ability of parents to support their children's development in a variety of ways, Head Start decreases the level of stress within the home, thereby reducing the stress response in children.

4. The family support systems that Head Start provides (health services, community involvement, etc.) and the increased parental involvement in Head Start creates a more "open" system (reduces the extent to which the family group functions as a closed system). Open systems are known to reduce the stress levels of their members (Rosenbaum, 1977), thus leading us to expect reductions in the stress reactivity of Head Start children.

5. Head Start improves the overall health of the child. Physical well-being (including improved diet and exercise) decreases children's over-reactivity to stressors.

Although there has been extensive development of instrumentation in recent years (primarily for use in biofeedback therapy) there has been no research into stress-reduction as a possible program outcome. For the reasons given above, this may well become an area to receive increasing emphasis in the future.

Health and Safety Attitudes

Throughout this paper the general importance of assessing attitudes and habits has been emphasized. The Input Workshops held during Phase I of the Head Start Measures Project pointed up the importance of health attitudes and habits in the eyes of Head Start parents and staff. Of the 50 statements of child outcomes that were ranked highest in importance, 18 related to health attitudes and habits. Health-related attitudes and habits are also important because of their implications for the long-term health of the child. If healthy habits (e.g., hygienic caring for cuts) are developed early and if positive attitudes toward health rules and practices that contribute to wellness are developed, then there is an increased likelihood that the health status of children (as measured physiologically) will be maintained beyond the preschool years. The National Academy of Sciences (1976) has encouraged policymakers to be more concerned with developing children's health care practices and attitudes. A growing number of health professionals believe that promoting more responsible health behaviors and attitudes strengthens children's role as health "consumers" leading to improved health in later life (Gallagher, 1976). In a study with elementary school children in Colorado, Driscoll and Igoe (1978) found that an educational program aimed at promoting knowledge of and attitudes toward participation in health care had a positive effect on children's knowledge and attitudes, particularly attitudes toward taking responsibility for their own health care, attitudes about obtaining health care, and attitudes toward health professionals.

Standardized procedures for assessing such attitudes do not presently exist, but a promising interview format was pilottested during the Head Start Measures Project. This technique provides a structured format allowing an interviewer to discuss a variety of health-related topics with the child in a

conversational style. The specific items focus on the child's attitude toward participation in medical care activities, such as a visit to the doctor, taking medicine, and caring for splinters and cuts. Safety attitudes are assessed by asking questions about attitudes toward safe playground, school and home behavior and attitudes toward unsafe objects and situations related to safety knowledge (see below).

Health Knowledge

Knowledge about various aspects of health and health care better equips the child to behave appropriately with respect to his or her own health. For some health practices, such as caring for cuts, knowledge of how to do so is obviously a prerequisite for appropriate behavior.

In addition to the value placed upon health knowledge by health professionals, parents and staff participating in the Input Workshops listed health knowledge characteristics among the items they felt it was important to measure (e.g., "Know to keep dirt out of open cuts", "know what medication should not be taken"). Head Start and other early childhood programs devote time to teaching children about proper personal hygiene, health care practices, and about the roles of health care providers. A comprehensive measurement battery cannot ignore this input and this educational program component.

Items assessing such characteristics can be incorporated in a child interview. The specific items could include questioning the child on his or her knowledge about personal health care and about the functions of doctors and nurses.

Safety Knowledge

A concern with safety has been a prominent component of Head Start since its beginning, but the concern has increased as statistics on the importance of

safety to children's overall health and well-being become more available. Accidents are the leading cause of death for young people (DHHS, 1980). Figures from the National Center for Health Statistics (1975) show that fully half of the deaths among children in the 5- to 9-year range are due to "unintentional injuries". About half of the injury-caused deaths result from motor vehicle injuries, with drownings, fire, firearms and poisoning accounting for 16.5, 11.9, 4.0, and 1.2 percent of the accidental deaths, respectively (NCHS, 1975). Although other writers may argue that environmental factors account for a significant portion of the accidents (Haddon & Baker, 1980), there is no escaping the fact that accidents are significant factors in the health of children, and that what children learn about their environment and how to safely negotiate it can directly affect their physical health.

Head Start parents and staff also expressed their concern for child safety through the Input Workshops. Four statements about safety knowledge or behavior ("do not play with fire or flammable objects", "do not tamper with electrical outlets", "play only in safe areas", and "do not play with knives or other sharp objects") were among the five outcomes rated as most important from among the 1,516 characteristics rated by workshop participants.

The interview technique also provides a means for assessing children's safety knowledge. The particular aspects of safety knowledge selected for measurement should represent some of the major environmental circumstances young children encounter in which knowledge of safety rules will serve to protect them from harm. These include safety at home (electrical outlets, matches, etc.), safety in school (running in hallways, etc.), safety with playground equipment, and knowledge about what to do in case of fire. This format has the added advantage of flexibility: It is relatively easy to add items that deal with locally important safety issues, such as procedures for fire drills (NAEYC, 1983).

Dental Health Dimension

The basic structure of the Dental dimension is conceptualized in much the same way as that of the Health and Safety dimension. All three types of characteristics are included among the indices of program effects: physiological statuses, attitudes and habits and knowledge. Three constructs have been identified as most important for measurement in this dimension: the physical condition of teeth, dental attitudes and habits, and dental knowledge.

Condition of Teeth

Tooth decay is an important health problem. In spite of the generally improved state of American's teeth since the introduction of fluoride to water supplies and toothpaste, cavities are still relatively prevalent in young children. In the National Preschool Nutrition Survey conducted in 1968-70, 46.2 percent of the three-year-old, low-income white children were found to have at least one cavity; 59.8 percent had at least one cavity at age four; and 73.0 percent had one or more cavities by age five (Owen et al., 1974). Data from the Head Start Health Evaluation confirm the significance of dental problems among three and four-year-old Head Start eligible children. The percent of children with at least one cavity ranged from 48 to 80 across the four sites included in that study (Fosburg et al., 1984). The incidence of tooth decay may be even greater among low-income rural and non-White children (Infante & Owen, 1970). The increasing incidence of caries with age indicates that there is a real potential for measureable program effects, i.e., programs can (a) arrange to have fillings made to correct existing problems, and (b) undertake steps that will prevent the appearance of additional caries.

In addition to its obvious importance for general physical health, poor dental health also has implications for other aspects of children's development.

Self-concept and interpersonal relations can be affected due to the influence that oral health has on overall appearance and well-being. The Head Start Performance Standards place considerable emphasis on the early identification and treatment of decay and on the prevention of the loss of teeth. Although it is not feasible for programs to conduct detailed and costly dental measures (e.g., x-rays, measurement of malocculusions, etc.), some reliable measures of physical condition are needed because of the centrality of this construct to the overall dental dimension.

Potential physiological aspects of dental health for inclusion in program evaluations include various indices of the condition of teeth and gums. Assessment of occulusion is not recommended because dental professionals generally do not provide treatment for malocculusions at this age level, except for very extreme cases. The measurement of gum condition (gingival inflamation) is not recommended because the incidence of gingival inflamation is expected to be relatively low and therefore not a major problem that programs will be able to affect (Russell, 1964).

Four basic physical conditions of children's teeth are important, however, and can be relatively easily observed and counted--the number of decayed, extracted and filled teeth, and the degree of plaque accumulations on the tooth surfaces. A standard dental measure (the def Index) provides information on decayed, extracted and filled teeth and can be administered by a dental hygienist. Standard procedures also exist for assessing plaque, such as the oral hygiene index. It should be noted, however, that a drawback to using an oral hygiene index for program evaluation purposes is that recent (even though not regular) teeth cleaning can produce a spuriously positive index.

Dental Attitudes and Habits

The attitudes and habits that develop in the early years can be important for determining the long-term dental health of children. Head Start parents and staff valued the development of such attitudes and habits (e.g., "be willing to go to the dentist", "brush teeth at least twice a day") and dental professionals increasingly concern themselves with implementing educational programs specifically aimed at promoting positive attitudes toward personal dental care and developing the necessary habits to carry out a program of home care (Horowitz et al., 1980). Head Start programs are required by the Performance Standards to encourage good dental habits by providing the necessary time, space and utensils for children to brush their teeth after snacks and meals.

Again, direct questioning of the child, aided by pictures and props, in an interview setting, is an effective technique for assessing attitudes. Questions should be included to obtain information on attitudes toward dentists and toward home dental care. Direct questioning is not likely to provide a valid measure of dental habits. Here, direct observation (which can be made by a teacher or aide) can be carried out in the center, and parents can be queried about the child's behavior at home.

Dental Knowledge

As in the health and safety dimension, knowledge is important here because it too can lead to improved habits and better dental health. Two characteristics of dental knowledge that were identified as especially important in the Input Workshops were knowledge about the role of the dentist and knowledge about dental care practices.

The child interview provides a means of assessing children's dental knowledge. Questions can be included on the role of the dentist, knowledge about objects used in home dental care (toothbrush and toothpaste), and the child's knowledge about foods that are bad for the teeth.

Nutrition Dimension

Nutrition is an important influence on children's overall health and physical development, and the Head Start Program Performance Standards (OCD, 1975; p. 39), require the "provision of a high quality nutrition component" that will provide one-half to one-third of children's daily nutritional needs, depending on the length of the program. Head Start programs, therefore, provide snacks and meals and conduct efforts to help children (and their families) understand the relationship of nutrition to overall health and competence and to help children (and their families) develop the knowledge, skills, attitudes and habits to maintain a sound nutritional status, during and after leaving the program. The NAEYC (1983) Center Accreditations Project likewise places great importance on healthy food service and nutrition education. To be comprehensive, all of these desired outcomes should be addressed by measures of program effects. Nutrition is also important in that it influences all other dimensions in the domain--health and safety, dental health and motor development; as such, nutrition is a vital part of overall preventive health care and wellness.

The characteristics recommended for measurement in the nutrition dimension are anthropometric status, anemia, nutrition attitudes and habits, and nutrition knowledge. Notably absent from this list are biochemical measures of nutrients, based on analysis of blood samples, and self-report measures of dietary intake. Although biochemical analyses may provide the greatest certainty with

respect to nutritional status, they require expensive equipment and procedures. Dietary intake or food consumption, therefore, is frequently measured instead (e.g., 24-hour recall methods). Such measures are not recommended for standard use because there is considerable room for error in dietary intake reports, including the fact that the mother (who is the most likely source of information about her child's diet) does not know everything her child eats when the child is enrolled in a preschool program, and may be inclined to try to make her child's diet appear more nutritious. According to Owen, Kram, Garry, Lowe & Lubin (1974) in their report on the Preschool Nutrition Survey, "currently used techniques for estimating dietary intake may be the weakest component of the assessment of nutritional status" (p. 643).

There is also a more basic reason for not placing a great deal of emphasis on nutritional status in a program's health evaluation. Based on 1968-70 data, the Preschool Nutrition Survey found that "clinical evidences of nutritional deficiencies were minimal" (Owen et al., 1974, p. 618). The authors go on to suggest that American diets are basically adequate and that the problem is primarily insufficiency of food rather than the nutritional value of the food consumed. The Head Start Health Evaluation, with data collected on Head Start eligible children in 1980, found that the mean nutrient intakes for protein, vitamin A, thiamin, riboflavin, Vitamin B_{12}, and vitamin C met or exceeded 100 percent of the daily recommended standards in all age groups at all sites studied. Furthermore, few children consumed diets supplying less than 66 percent of the weight-adjusted caloric intake standard. (Across the four sites, figures ranged from 6 to 11 percent of the children whose diets did not meet this standard.) Calcium and iron were the nutrients least adequately represented in these children's diets. (Only 35.5 percent of the children overall had diets providing

100 percent of the recommended calcium; only 25.5 percent received 100 percent of the recommended amounts of iron.)

Although a detailed analysis of nutritional status seems undesirable for the purposes of most local program evaluations, it is still important to obtain (a) a general indicator of nutritional status, (b) a measure of one particularly important dietary element--iron, and (c) data on children's knowledge, attitudes and habits that may be predictive of present and later nutritional status. A general indication of nutritional status can be obtained by measuring a few basic anthropometric variables. The important dietary element to measure is iron deficiency, and several aspects of children's knowledge, attitudes and habits can be assessed.

Anthropometric Status

Two anthropometric characteristics, which were discussed in connection with the health and safety dimension, make up this component of the nutrition dimension. These are height-for-weight (analyzed as height/weight^2) and triceps skinfold thickness. Change in these measures (or rate of growth) provide useful indicators of the nutritional status of children. The focus on change that this measurement system provides is especially appropriate for nutritional measures since it is the "velocity of growth which may be most affected by nutrition" (DHEW, 1975).

Anemia

"Iron deficiency is the most commonly recognized form of nutritional deficiency..." (Dallman, Siimes, & Stekel, 1980, p. 86). Although it is not the only cause of anemia, it is by far the most common one (Dallman, et al., 1980). It is easily measured using iron deficiency indicators such as the standard tests

for hemoglobin levels in the blood. Hemoglobin (or hemotocrit) tests are already recommended by the Head Start Performance Standards for programs to use in screening youngsters. Iron deficiency is an important aspect of overall health as seen by the effect that an anemic condition can have on children's energy for a wide variety of activities, including those important for physical health and those involved in classroom learning activities and social behavior.

Although the prevalence of iron deficiency in the total population may be relatively low, it is still a problem among the low-income population served by Head Start, and thus is an area where programs have the potential for demonstrating effects. The national Preschool Nutrition Survey (Owen, et al., 1974) found low hemoglobin levels in about 15 to 20 percent of low income children, Lane and Johnson (1981) reported that 15 percent of the children in a sample of 275 tax-supported clinics had low hemoglobin levels, and more recently a survey by the Massachusetts Department of Public Health found 12.2 percent of low-income preschool children to be anemic (Report on Preschool Programs, 1983). As cited above, the recent Head Start Health Evaluation found that only one-quarter of the children received the recommended amounts of iron.

Iron deficiency is readily treated so that this measure can clearly show program effects where cases of iron deficiency are detected at the beginning of the program year. The typical therapy, oral doses of ferrous sulfate and/or the prescription of iron-fortified food, can be expected to raise hemoglobin levels to the normal range within two months (although therapy is usually continued for five months to ensure accumulation of storage iron--Dallman, et al., 1980).

Nutrition Attitudes and Habits

Attitudes and habits are basic factors in good nutrition. Even though nutritional status improvements may not be detectable when dietary intake is basically adequate, young children are learning food habits and attitudes toward

food and eating that will sustain them through adulthood. Hence, measures of food behavior and attitudes toward foods serve as indicators of program effectiveness. The Head Start parent and staff input also showed the concern that Head Start programs have with the development of appropriate attitudes and habits. These included such items as "experience a variety of foods", "recognize junk food and choose nutritional food", and "eat a balanced diet".

We often assume that positive attitudes toward nutrition will actually lead to more nutritious eating habits, and there is some evidence of a relationship between attitudes and habits in the area of nutrition (Regan & Fuzio, 1977; Swanson, 1972). Studies by Birch (1979a) and Vance (1932) indicate that young children's food preferences can be predictive of actual food consumption. Birch (1979b) has also demonstrated that children as young as three years can provide reliable and consistent information about their food preferences. Food preferences are thus particularly important to assess.

In deciding on the important nutrition-related behaviors to assess our concern is with those that are most likely to contribute to long-term health in light of today's nutrition-related health problems and today's food supply (Contento, 1980). Today, nutrition educators consider familiarity with, and willingness to try, a variety of nutritious foods to be the major goal of nutrition education with young children (Olson & Cumbers, 1981). The measurement of children's selection of food pictures may relate to this goal, but an even better indicator of their nutritional habits is their actual eating behavior. Because of the inadequacies of dietary intake methods discussed above, it is preferable to obtain a direct measure of food choices by observing children's behavior at mealtime.

Sophisticated observation procedures, requiring special forms and training have been used in a number of contexts, e.g., in a nutrition study conducted by the U. S. Department of Agriculture (Macaluso, 1981). Using a form that records the amounts of all foods served at lunch in the center or school, an observer records the quantities actually consumed by the child. Preliminary evidence from the USDA study suggests that observers can make these judgments reliably (Macaluso, 1981), and findings from a study using similar procedures for observing elementary school children indicated correlations of about .93 between visual estimations of amount of food wasted and actual amounts (Comstock, St. Pierre, & Mackiernan, 1981). Since food choices can show considerable variation due to a variety of factors, it will be necessary to conduct the meal observations over several days in order to obtain a valid index of the nutritional habits of individual children. Even without the time or resources demanded by such a procedure, the program can develop a simple checklist based on the primary food groups, and obtain a general indication of children's food preferences and other eating habits.

Nutrition Knowledge

Knowledge about nutrition can be a direct outcome of the nutrition education features of early childhood programs, and may be an indirect outcome of improved nutritional habits. The program concerns were reflected in the Input Workshop statements obtained in the Head Start Measures Project, which included such outcomes as "recognize the four basic food groups", "be able to name different foods", and "know the nutritional value of foods". While it is traditional to assess whether children can name the "Basic Four" or can place foods into these categories, there has been increasing question about the usefulness of this practice on the basis of both nutritional concerns (Dodds, 1981;

Light & Cronin, 1981; Pennington, 1981), and educational grounds (Contento, 1980; Poolton, 1972). For example, a meal consisting of a hot dog on a roll, french fries, and a milkshake contains one item from each of the four food groups, just as does a meal of broiled fish, brown rice, broccoli, and skim milk. In other words, the Basic Four system does not distinguish between foods that are high in fat and sugar and those that are not.

Preschool-aged children should be able to sort pictures of foods into "nutritious" and "non-nutritious" categories, and should be able to give simple, concrete reasons why certain foods are "good" for them and others are not (Contento, 1981). Older children can give more detailed information, such as the names of foods that are high in fats, sugar, salt, iron, protein, etc. (Contento, 1981). With the aid of pictures, such as those available from the National Dairy Council (1975), direct questioning in an interview format can yield rich information on children's knowledge about nutrition.

Motor Development Dimension

The importance of motor skills for effective functioning is generally recognized among scholars and practitioners in early child development. Dorothy Eichorn has been particularly eloquent in presenting the centrality of motor performance in development:

> Motor skills and coordination are an important component of competent performance and healthy development thorughout the life span. Because motor skills and coordination are basic to competence in a broad range of performances essential to everyday living as well as academic accomplishments, and because their exercise also promotes physical health, enhancement of motor development has always been one of the goals of Head Start programs (Eichorn, 1980, p. 63).

The Head Start Program Performance Standards require the "promotion of physical growth by activities designed to develop large muscles (wheel toys, climbing apparatus, blocks); small muscles (scissors, clay, puzzles, small blocks); eye-hand coordination (puzzles, balls, lotto); body awareness; rhythm and movement (dancing, musical instruments)" (OCD, 1975, p. 8).

Concern with sensitivity to program effects is especially relevant in this dimension because most evaluations of Head Start have found few significant program effects on fine or gross motor development. The evaluation of the Home Start Demonstration Program, for example, found practically identical gains for the program and control groups on both the fine and gross motor scales of the Denver Developmental Screening Test (Love, Nauta, Coelen, Hewett & Ruopp, 1976). And this was true even in the context of a program that was shown to be effective in a number of other child development areas such as school readiness. In their comprehensive review of Head Start evaluations conducted between 1969 and 1976, Mann, Harrell and Hurt (1977) reviewed hundreds of studies, finding many significant effects on cognitive and social-emotional development and on children's health, but the report makes no mention of motor development, suggesting that studies have not found significant impacts in this dimension. Because of the implications for evaluation, the absence of program-effect findings bears some discussion.

One possible reason for lack of positive findings may be that the program-related experiences children receive in fine and gross motor activity are simply not that different from the experiences of children who do not attend Head Start. This may be a plausible explanation for gross motor skills because physical activity involving the large muscles--running, jumping, etc.--is prominent in the lives of many children and its exercise can be carried out with

little adult direction. On the other hand, it seems less likely that non-participating children would obtain fine motor experience equivalent to the many classroom activities found in Head Start and many daycare programs (such as coloring, cutting, pasting, painting, block building, bead stringing, and puzzle making).

Since Head Start has been shown to have significant impacts on other aspects of social competence, the problem may lie not with the construct but with the instruments that have been used for assessing motor development. For the most part, Head Start evaluations have used adaptations of developmental screening inventories, which were originally designed to provide a clinician with a rough indicator of developmental status that could later be followed up by more in-depth diagnoses. These inventories contain few items applicable for any given age level and may simply not be sensitive to small but important differences between groups of children.

Another possibility, as suggested in the views of Eichorn mentioned above, is that the tests available are not sensitive to program effects because the skills measured are too simple. It is, therefore, important to include items that tap more complex skills and higher-order skills that require the integration of lower-level skills.

For these reasons then, assessment of motor development should focus on fine motor skills. As discussed above, Head Start children are provided many fine motor activities that are less likely to be experienced by children not enrolled in this or similar programs. Fine motor skills are also an important focus because such skills are precursors of a number of academic skills such as writing. By focusing on a smaller number of motor skills, we can also ensure greater coverage of specific points along the entire age range to create greater measurement sensitivity to small but important program effects.

Many existing tests have devised exercises for the child to perform that are unlike the "real-life" behavior in which the skill normally appears. The purpose of this is to avoid situations in which a curriculum might directly teach the behaviors required for demonstrating the skill on a test, but the result often requires the child to engage in some rather unusual, and perhaps awkward activities. Wherever possible, motor skills should be assessed using activities that reflect naturally occurring behaviors. Two areas of motor development that are most critical at this age--visual-motor control and hand and finger dexterity can be measured in "natural" settings.

One of the central aspects of motor proficiency identified by Bruininks (1978), in a review of studies investigating motor performance of children, was visual-motor control. In particular, Bruininks' review concluded that "integration of visual-perceptual responses with highly controlled motor responses is required for success in reading and handwriting" (p. 17). In the Input Workshops, Head Start parents and staff specifically mentioned several fine motor skills that relate to the construct of visual motor control, including "use scissors", "be able to draw straight line, triangle, square", and "be able to draw what they see".

After reviewing and considering many motor development instruments, including those unsuccessfully used in previous evaluations, it appears that many items of the Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978) have promise. Initial pilot testing with small numbers of children has indicated, however, that considerable adaptation is necessary to make the items suitable to the lower age range (3 and 4 year olds) and to increase the number of scores obtained throughout the age range (Love & Freundel, 1982). Thus, in the Head Start Measures Project there was extensive revision of selected items, but preliminary reliability data were quite promising. The specific items of visual-

motor control selected are tracing and copying simple geometric shapes and cutting a straight line and circles of different diameters. In addition, older children are given a line drawing of a fish to trace, copy, and cut out, to increase the complexity of their task.

The Head Start Input Workshops demonstrated the importance that Head Start parents and teachers attach to fine motor dexterity. This was expressed in very concrete terms, such as "be able to pick up thin, small objects", "be able to put pegs in a pegboard", and "be able to string beads". Bruininks' (1978) literature review also identified this general area as a basic component of motor development: "Precision and speed of fine motor movements are essential components of skilled motor performance in vocational activities, play, and sports" (p. 17). Rather than including a wide range of dexterity items, we recommend focusing on those most closely associated with school and school-like activities, and omitting skills more closely associated with sports (such as ball-throwing). These include skills such as those employed in sorting cards, quickly moving pegs from one row of holes to another in a pegboard, picking up colored disks (tiddly-winks) and placing them in a small box (first with one hand and then bilaterally), and stringing beads. Both accuracy and speed are recorded, with older children having more objects to sort, displace or string, so as to increase the test's ceiling.

Conclusion

This chapter has argued for the importance of evaluating children's health and physical development and has suggested specific ways in which early childhood programs can conduct meaningful evaluations. Meaningful evaluations only occur when the critical constructs are assessed and when reliable

procedures are followed. The work of the Head Start Measures Project provided a basis for presenting an array of critical constructs; and pilottesting conducted during that project provided experience with reliable procedures.

Another criterion for a meaningful evaluation is especially important--that of comprehensiveness. There is such a high degree of interdependency among the areas of health, safety, nutrition, dental health, physical growth and motor development that programs must look across all dimensions in order to obtain the clearest picture of the changes in children that the program is affecting.

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Table 1

Constructs and Characteristics Measured
Within Each Dimension of the Health and Physical Domain

Dimension	Construct	Characteristic
Health & Safety Dimension	Anthropometric Status[1]	Height for age Weight for age Weight for height Triceps skinfold
	Anemia[1]	Iron deficiency
	Immunization Status	Completed innoculations[2]
	Vision Hearing Speech	Screenings and corrective action as needed[2]
	Physical Fitness	Muscle strength Cardiovascular efficiency Lean body mass
	Functional Stress Range	Stress sensitivity Range of performance under stress
	Health Attitudes and Habits	Attitudes toward and habits of participating in medical care activities
	Health Knowledge	Knows functions of doctor Knows personal health care
	Safety Knowledge	Knows name, address, phone no. Knows safety rules Knows reasons for rules Knows fire safety Identifies unsafe objects
Dental Dimension	Condition of Teeth	Number of decayed, extracted, filled teeth
		Screening and corrective action as needed[2]
	Dental Knowledge	Knows items used in home care Identifies high-sugar, sticky food
	Dental Attitudes and Habits	Attitude toward toothbrushing Has own toothbrush Attitude toward dental visit Frequency of toothbrushing
Nutrition Dimension	Anthropometric Status[1]	Weight for height Height for age Weight for age Triceps skinfold
	Anemia[1]	Iron deficiency
	Nutrition Attitudes and Habits	Food preferences Food choice habits
Motor Development Dimension	Visual Motor Skills	Tracing Copying Cutting
	Hand and Finger Dexterity	Placing discs Sorting cards Displacing pegs Stringing beads

[1]Anthropometric status and its associated characteristics and anemia are conceptualized as contributing to both the Nutrition and Health and Safety dimensions.

[2]Technically these "characteristics" refer to program services rather than direct child outcomes; they are included among the measures because they provide clear evidence of changes in children's health status.

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